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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER HUYNH, YENNHU B				
ART UNIT		PAPER NUMBER		
2813				

DATE MAILED: 01/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/724,403

Applicant(s)

MAEKAWA, SHINJI

Examiner

Yennhu B Huynh

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MW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 7-9, 20 and 60-71 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7-9, 20 and 60-71 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the Amendment C filed on 10/20/03.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/20/03 has been entered.

Election/Restrictions

Currently, claims 1-4, 7-9, 20 and 60-71 are pending.

Claims 5-6, 10-19 & 21-59 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected claims, there being no allowable generic or linking claim. Election was made without traverse in Paper No. 9.

Priority

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in JP 11-336850 on 11/28/2000. It is noted, however, that the certified copy of the Japanese application has not received as required by 35 U.S.C. 119(b).

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Information Disclosure Statement

The information disclosure statement filed on 12/2/02 is being considered by the examiner.

Oath/Declaration

Oath/Declaration filed on 11/27/00 is accepted.

Specification

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Method of Manufacturing A Semiconductor Device.

Claim Rejections - 35 USC § 112

Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 20, line 1 is objected to because of the following informalities: --claim 4 or 9--
It is indefinite. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 7, 62 & 65 rejected under 35 U.S.C. 103(a) as being unpatentable over Wilcoxon (U.S. 5,059,556) in view of Ritsuo et al. (JP 6338507).

Wilcoxon disclose a method for relieving stress in silicon substrate, which include:

-Re. claim 1: forming a semiconductor film 12 over the substrate 2 (fig.4-6); wherein a material layer 14 having stress of not more than 8×10^9 /cm² is formed in contact with a semiconductor is formed on substrate (col.2 & 3, lines 62-29 and fig.6 col.4 lines 37-41, col.5 lines 13-18), whereby an argon impurity element in the semiconductor film is bringing material (col. 4 lines 37-54).

However, Wilcoxon does not disclose whereby an impurity element in the semiconductor film is gettered into the material.

Ritsuo in related art disclose a semiconductor device manufacturing, which include a material having a tensile stress and this stress is becomes gettering site by accelerated carbon impurity element in the semiconductor film (Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Wilcoxon invention by incorporation an impurity element in the semiconductor film is gettered into the material, to eliminate the impurity from an active region for the device.

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Wilcoxon also discloses:

-Re. claims 2, 7 & 62, wherein the material is formed by sputtering LPCVD, and within a temperature range of between 500-900 C degrees (col.4, lines 16-46).

-Re. claim 65: wherein the material is a silicon nitride film formed by LPCVD (col.5, lines 31-45 and col. 7, lines 3-8).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3,4,8,9,20,60,63,64 & 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilcoxon (U.S. 5,059,556) in view of Ritsuo et al. (JP 6338507) and Yonehara et al. (U.S. 5,670,411).

Wilcoxon and Risuo et al. disclose substantially all of the claimed features, but do not disclose the forming LPCVD with chloride gas (cls. 4, 9 & 64); wherein the Cl_2 is a mixture gas of any one of SiCl_4 , SiH_2Cl_2 , SiCl_3 or Si_2Cl_6 (cl.20 & 60); and the pressure range of LPCVD as well as the ratio of nitride silicon (cls. 3,8,63 & 66).

-Re. claims 4,9,20, 60 & 64: Yonehara et al. disclose a process of making a semiconductor device with impurity element is gettered into the material, which include wherein the material is formed by LPCVD with a gas containing chlorine and is a mixture gas of any one of SiCl_4 , SiH_2Cl_2 , SiCl_3 or Si_2Cl_6 (col. 8 & 9, lines 33-2).

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Wilcoxon and Ritsuo et al. invention by incorporation the mixture gas containing chlorine to control the growing of impurity diffusion during heating process.

With respect to claims 3, 8, 63 & 66 the pressure, ratio are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art, As noted In re Aller 105 USPQ233, 255 (CCPA 1995), the selection of reaction parameters such as temperature and concentration would have been obvious.

"Normally, it is to expected that a change in pressure, temperature, or in range of ratio, concentration, cycles, thickness, would be an unpatentable modification. Under some circumstance, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality ... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller 105 USPQ233, 255 (CCPA 1995). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wilcoxon (U.S. 5,059,556) in view of in view of Ritsuo et al. (JP 6338507) and Yamazaki et al. (U.S. 6,444,390 B1).

Wilcoxon disclose a method for relieving stress in silicon substrate, which include:

-Re. claim 61: forming a semiconductor film 12 over the substrate 2 (fig.4-6); wherein a material layer 14 having stress of not more than 8×10^9 /cm² is formed in contact with a semiconductor is formed on substrate (col.2 & 3, lines 62-29 and fig.6 col.4

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lines 37-41, col.5 lines 13-18), whereby an argon /carbon (impurity carbon disclosed by Ritsuo et al. , Abstract) impurity element in the semiconductor film is bringing material (col. 4 lines 37-54).

However, Wilcoxon and Ritsuo et al. do not disclose removing the material having tensile stress, a gate insulating and a gate electrode.

Yamazaki et al. disclose process for producing a crystalline silicon with getting impurity element in a semiconductor film, which include removing the germanium material having a tensile stress (Abstract, col. 4, lines 23-28 and col.5, lines 31-35) , a gate insulating 205 and a gate electrode 206 (col. 6, lines 47-53 and col.7, lines 50-63, fig. 2A).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wilcoxon and Ritsuo et al. invention by incorporation of removal the material having tensile stress to crystallize the semiconductor film.

Claims 67-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilcoxon (U.S. 5,059,556) in view of Ritsuo et al. (JP 6338507) and Zhang et al. (U.S. 6,140,165).

Wilcoxon and Risuo et al. disclose substantially all of the claimed features, but do not disclose wherein the impurity element is a metallic element selected from the group consisting of nickel, iron, cobalt, ruthenium, rhodium, palladium, osmium, iridium, platinum, copper and gold (cls. 67-71)

Re. claims 67-71: Zhang et al. in related art disclose forming a semiconductor device, which include the impurity element is a metallic element selected from the group consisting of nickel, iron, cobalt, platinum (Abstract and col.3 and +, lines 65-68)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wilcoxon and Ritsuo et al. invention by incorporation impurity element is a metallic element selected from the group consisting of nickel, iron, cobalt, platinum to promote the crystallization of silicon into the substrate.

Pertinent Prior Art

Takizawa et al. (U.S. 5,734,195) disclose a semiconductor wafer having a sub-surface getter region. The structure includes a wafer, a second element ion implanted into the substrate wafer and accelerates oxygen precipitation to form crystal defects and these crystal defect serve as gettering site and stress is generated, wherein the stress itself serves as a gettering site (col.1, lines 50-63, col. 2 & 3, lines 23-6+).

Kaoru (JP 7201842 A) disclose forming a gettering region in a scribing line on a surface of a wafer. The process includes a silicon substrate is selectively oxidized after a polysilicon film for relaxation of stress is removed. The stress is enlarged so that a large amount of crystal defect as gettering source is induced in the silicon substrate (Abstract).

Response to Arguments

Applicant's arguments with respect to claim1-4, 7-9, 20 & 60-71 have been considered but are moot in view of the new ground(s) of rejection.


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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yennhu B Huynh whose telephone number is 703-308-6110 (and the new telephone number 571-272-1692 will be effected from 2/5/04). The examiner can normally be reached on 8.30AM-7.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-7724

Yennhu Huynh 
Examiner

1/9/04